A STUDY ON LEAN SUPPLY CHAIN IMPLEMENTATION IN MALAYSIA'S ELECTRICAL AND ELECTRONICS INDUSTRY: PRACTICES AND PERFORMANCES

By

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ABSTRAK

Kertas kerja kajian ini adalah bertujuan untuk memenuhi tuntutan untuk pengenalpastian pengetahuan, ilmu serta sumber-sumber yang dapat diutarakan secara teoritikal dan praktikal serta menjadi rujukan kepada organisasi-organisasi yang berkaitan dalam menjayakan konsep kebersandaran ringkasan rantaian bekalan ini. Kajian ini bertujuan mengenal pasti tahap kebersandaran rantaian bekalan dipraktikkan dan keberkesanannya oleh syarikat - syarikat atau organisasi sektor Elektrik dan Elektronik di Malaysia. Pendekatan rekabentuk yang digunakan bagi kajian ini adalah regrasi hirarki pelbagai dan regrasi pertengahan atau sederhana, bagi mengenal pasti dari segi pemboleh ubah statistik yang diuji kepada beberapa kumpulan sasaran seperti pengurusan atasan, pertengahan dan bawahan yang terlibat secara terus dengan pengaplikasi kebersandaran rantaian bekalan ini. Keputusan daripada regrasi hirarki pelbagai dan regrasi pertengahan menunjukkan kos yang lebih rendah dicapai bagi pembaziran (penyebad pembazuiran dalaman) dan pengurangan masa pemprosesan, diikuti oleh kualiti yang lebih baik serta mutu pembekalan produk. Kekurangan kajian ini adalah kesimpulannya bergantung kepada intepretasi penggunaan dan konsep "kebersandaran rantaian bekalan". Memandangkan kaedah ini masih baru, maka pihak yang ingin mengaplikasi kaedah ini perlu memahami konsep rantaian bekalan ini seluruhnya sebelum dapat mempraktikannya. Jika salah mengaplikasikannya, ianya boleh menyebabkan pembaziran yg pelbagai. Secara implikasinya, perhatian mesti dititikberatkan kepada pekerja lapangan yg ingin mencuba konsep ini dan organisasi perlu menyediakan kemudahan jabatan

kebersandaran ringkasan ini supaya proaktif dalam memainkan peranan dalam mempraktikan konsep ini sebagai satu strategi yg penting kepada organisasi. Kemudahan pengetahuan boleh digunapakai dalam memperkenalkan praktis konsep kebesandaran ringkasan bekalan rangkaian ini. Injuksi dari pihak badan kerjasama kerajaan seperti FFM, SME Corp dan MPC juga perlu utuk memberi kesan yg terbaik terutamanya memberi fokus kepada kajian dan pembangunan dalam bidang yg diutarakan ini. Pihak kerjasama ini perlu memberi kemudahan dan peluang, latihan serta bengkel-bengkel dan seminar terutamanya kepada industri kecil dan sederhana yg kian pesat membangun. Seterusnya, ianya memberi manfaat secara keseluruhan terutamanya kepada badan kerjasama kerajaan untuk mengaplikasikan keberkesanan konsep ini.

A STUDY ON LEAN SUPPLY CHAIN IMPLEMENTATION IN MALAYSIA'S ELECTRICAL AND ELECTRONICS INDUSTRY: PRACTICES AND PERFORMANCES

ABSTRACT

This paper fulfils an identified knowledge, information and resources that needs and offers on theoretical and practical ways in order to have references for the organization in order to promote the acceptance and implementation of lean supply chain performances. The purpose of the study is to explain the extents of lean supply chain practices and lean performances towards lean supply chain performances as experienced by Electrical and Electronics firms in Malaysia. The extents of lean supply chain practices to be investigate as one of the best way to a sense of total improvements within mentioned sectors. The analysis approach that has been used in this study are simple regressions and multiple regressions in order to determine whether it's have the statistically significant to the existence of extensions between the set of variables to be tested for several defined groups like top management, middle management and lower management that directly involve in lean supply chain. Besides, it could help to determine which of the independent variables account the most influences towards lean supply chain performances in Malaysia. It was also utilized to determine which of the independent variables would be main contributor to lean supply chain performances. The finding from this analysis revealed that cheaper cost towards internal waste lead and cycle time reduction were the most influential extended factors on lean supply chain performances, followed by better quality and faster throughput towards supplier engagement and collaboration. Whereas, demand signal component shows that there no direct influences through lean performances and lean supply chain performances. These are to say that not the

demand signal factor doesn't contributed enough to the lean supply chain performances but it seems like the organizations giving less attentions to the demand signal activities. One of the limitations of this study is that the conclusion drawn from the survey was principally due to the variety of interpretations of what the term and concepts of "lean supply chain performances" actually means. Since, this is a newly concept that need to adapt, it's possible that the lean practitioners should have a solid knowledge before they implement it. It's a waste of multiple of resources if doing it wrongly. From practical implications point of views, attention should be given to improve employee participation and lean department should play a proactive role in practicing the lean supply chain as a strategic tool. Hence, the knowledge and information can be utilized to promote the acceptance and implementation of lean supply chain practices. Government bodies can therefore focus on related factors for further development of lean supply chain as a total improvement. Related government bodies for manufacturing and operation such as FFM, SME Corp and MPC can therefore focus on these factors for further research development of lean supply chain practices and performances. These organizations can organize more training and seminars to smaller manufacturing companies to expose the concept of lean supply chain upfront, as the concept can consider new, limits to insufficient resources.

CHAPTER 1

INTRODUCTION

1.0 Introduction

Supply chain nowadays becoming a vital entity to the organizations performance measurement and metrics, has received much attention from researchers and practitioners. To support this, Gunasekaran, Patel (2001) and McGaughy (2004) have discussed that the role of these measures and metrics in the success of an organization cannot be overstated because they affect strategic, tactical and operational planning and control. Some more, the revolution of SCM in the last decade has testified that an increasing number of companies seek to enhance performance beyond their own boundaries (Boyson et al., 1999; Proirier, 1999). Supply chain has been viewed on every perspective. According to Agarwal and Shankar (2002), a supply chain is an inter-linked set of relationships connecting customer to supplier, perhaps through a number of intermediate stages such as manufacturing, warehousing and distribution processes.

Accordingly, Harland (1996) have clearly stated that supply chain also often refers either to a process-oriented management approach to sourcing, producing, and delivering goods and services to end customers or, in a broader meaning, to the co-ordination of the various actors belonging to the same supply chain. Intense competition compels companies to create close relationships with their upstream and downstream partner (Togar & Ramaswami, 2004). In the competitive environment, most leading edge companies realized that by transferring costs either upstream or downstream, they are actually not increasing their competitiveness, since all costs ultimately make their way to consumers (Cigolini, Cozzi & Perona, 2004). Hence, Cigolini, Cozzi and Perona (2004), have mentioned that supply

chain management guides firms to co-operate with a common goal to increase the overall channel sales and profitability, rather than competing for a bigger share of a fixed profit. One strategy for coordinating within and between firms with a focus on achieving efficiency, eliminating waste or overburden and creating value in products is the concept of lean management (Womack & Jones, 1996). Consequently, Vonderembse, Uppal, Huang, and Dismukes (2006), highlighted on the strategies and methodologies for designing supply chains that meet specific customer expectations. According to them, three different types of supply chains can be defined:

1. A lean supply chain, which employs continuous improvement efforts which focuses on eliminating waste or non-value steps along the chain.
2. An agile supply chain, which responds to rapidly changing, continually fragmenting global markets by being dynamic, context-specific, growth-oriented, and customer focused.
3. A hybrid supply chain, which combines the capabilities of lean and agile supply chains to create a supply network that, meets the needs of complex products.

Lean thinking is focused on eliminating waste from all processes while enhancing material and information flow along the supply chain (McCullen & Towill, 2001). The impact of lean thinking as a strategy for the supply chain and not just manufacturing is important and has received a lot of interest from both industry (including service) and academia. Hence, the purpose of this study is to explore the implementation of lean supply chain management practices in manufacturing industry in Malaysia, and identifies the impact of these practices on lean supply chain performance.

1.1 Supply Chain

Supply chain management (SCM) is the term used to describe the management of the flow of materials, information, and funds across the entire supply chain, from suppliers to component producers to final assemblers to distribution (warehouses and retailers), and ultimately to the consumer (Johnson& Pyke, 1999). Briefly, a supply chain is a collaboration of network of retailers, distributors, transporters, storage facilities, and suppliers that participate in the production, delivery, and sale of a product to the consumer. It is essentially made up of multiple companies who coordinate activities to set themselves apart from the competition (Keiztman, 2009). The supply chain process is a core business process of major importance for the realization of business strategy. It determines numerous key performance indicators of an organization and has a major impact in its profitability and competitiveness. Therefore, supply chain can be considered as maybe the most suitable operational framework for a transformation process to be based on (Fassoula, 2005).

According to Keiztman (2009), supply chain has three key parts. First is supply focuses on the raw materials supplied to manufacturing, including how, when, and from what location. Second is manufacturing focuses on converting these raw materials into finished products and third is distribution focuses on ensuring these products reach the consumers through an organized network of distributors, warehouses, and retailers. Agarwal & Shankar (2002), supported that supply chain management consists of the coordination of demand and supply of products. It involves the flow of product, information, and money between the 'trading partners' of a company's 'supply chain' and services between a suppliers' supplier and a customers' customer.

A supply chain is not limit to manufacturing and consumer products, a supply chain can also be used to show how several processes supply to one another. For overall, supply chain are applies in a total of processes in term of IT technology, finance, and many other

industries applications (Keiztman, 2009). Related to the supply chain performances, a supply chain strategy defines how the supply chain should be functioned in order to compete in the market (Fassoula, 2005). The strategy will evaluate in term of benefits and costs related to the operation. Comparing between business strategy that are focus on the total direction of a company wishes and approaches, supply chain strategy more towards on the actual operations of the organization. This is because supply chain strategy will be use in order to meet a specific organization's objectives and business goal (Keiztman, 2009).

1.1.1 Global Supply Chain Issues

Basically, several issues exist in the global supply chain processes. According to Huang, Uppal and Shi (2002), there are three main problems that related to the supply chain. First is the flow of information management in the supply chain was not instantaneous, therefore the upstream members were not fully informed with market changes such as changing trends, quantity of raw material needed etc. this impact which lead to a discrepancy in the number of products to be manufactured. This issue has been supported by (Aberdeen, 2006), as known as the "bullwip" effect in supply chain terminology.

Second issue is the enterprise does not form strategic alliances with their internal and external suppliers, which could prove to be a source of weakness this issue has been dealt with in the last few years and substantial improvements have been made in order to have a better supplier's relationship. Martin (2007) stated that the organizational misalignment (does not form strategic alliances) is the most reason for deployment failure. It leaves isolated and poorly integrated improvement projects scattered across the supply chain. It is difficult to accurately estimate business benefits in these situations. This is because; full implementations of lean methods require implantation of precursor systems of key component of lean systems for each having a unique set of tools and methods, which build on each other over time.

Third issue, the distribution was not recognized for its important roles in cutting down cost and lead time, and increasing the availability of finished products. It also could cause delay on product differentiation, so that the customization could not be achieved and over-stocking and stocks-out could not be avoided. The realization of these shortcomings led to the development of lean supply chain. There a lot of improvement to make supply chain more effectives.

1.1.2 Supply Chain Issues in Malaysia

From the Malaysia's perspectives, the complexity of issues in the supply chain provides the real insights in term of the actual supply chain businesses and activities influence the actual current business situation in Malaysia. According to a report from Ernst (2004), Malaysia's electronic industry is practicing value-chain-based manufacturing and cluster-based development as industrial key competencies for upgrading strategy. Evidences showed that most of the challenges discussed related to supplier relationships; Rosnah (2004) and (Ndubisi et al., 2005) stressed that supplier relationships are the major problem to implement a smooth supply chain practices in electric and electronics firms in Malaysia. Same goes to Tareq and Suhaiza (2009) in which, they found that the relationship orientation with supplier is important when implementing green supply chain. In addition, IBM Malaysia Global Business Consulting Services (2010), trading partners (suppliers) collaboration is of main focus agenda of supply chain improvement. Besides, the focus on top-line revenue growth, some how experiencing challenges in several areas, including:

- due to excess and obsolete inventory; cost pressures incurred and profits decreased
- customer satisfaction decreased due to lack of available-to-promise (ATP); low commitment on-time products or services delivery
- lack of e-procurement; not consistently delivered as promise of value

- point solutions have not accurately fixed certain of issue across the entire value chain
- lack of product innovations; competitors advantage lead market share.

To overcome such of the situations, the improvement of shareholders values (through cost reduction and accelerated growth) and excellences of suppliers relationship, the approach of lean concept in the supply chain management are being viewed, as it also another area of opportunities in the windows of supply chain performance (IBM Malaysia Global Business Consulting Services, 2010). Nowadays, the implementation of lean becoming trends and it does consistently prove to make improvement and performance to supply chain businesses as overall.

1.2 Background of the Study

Manufacturing has evolved from the ages of craft production and mass production to more recent lean manufacturing (LM) and agile manufacturing (AM) (Anand & Kodali, 2008). Along with these developments in manufacturing, the field of SCM has also evolved and grown rapidly. Since the manufacturing and supply chain (SC) of an organization are closely related, the developments that happen in one will affect the other. As a result of mass industrialization and supply chain consumption around the world, lean supply chain concerns are increasing in importance and effect on business objectives and performance. This section basically, provides background information about the evolution of lean initiatives in the context of world and Malaysia in particular, and explains the effects of the lean supply chain performances and its expected role in providing advantages and opportunities to business organizations. For instance, Ariff and Ahmed (2005) used a case study of a medium-sized industry in Malaysia to present strategies to instill supplier capabilities and the support activities in creating a lean supply chain across multiple tiers of Small and Medium-sized Industries (SMIs). On the other hand, Christopher (2000) provided a distinction between the

philosophies of ‘leanness’ and ‘agility’, apart from discussing the appropriate application of these agile ideas in supply chains.

As mentioned, in a globally-competitive economy, enterprises must pay continuous attention to increasing responsiveness to changes in customer demand and to maintenance of a competitive advantage over their rivals. According to Agarwal and Shankar (2002), as part of this constant review and search for improvement, supply change management has become an area of studies, since it focuses on material, information and cash flows from vendor to customers or vice-versa. Supply chain activities also are argued to have connection with humanitarian aid which often treated as a series of discrete activities (Taylor & Pettit, 2009). On the other hand, McGuire (2001), concluded that each aspect should be seen as part of a continuum has not generally been a priority, often leading to large amounts of waste (McGuire, 2001). As a study from Malaysian perspectives, for many organizations, developing the lean production system is a key element is their supply chain management practice (Rozhan & Rohayu, 2008). Therefore, in their study, they have recommended that the company need to focus on:-

- Improve value delivery to customers;
- Rely on just-in-time system;
- Eliminate waste;
- Get the involvement of all stakeholders in the value creation process;
- Develop close collaboration;
- Work closely with suppliers;
- Reduce the number of suppliers; and
- Develop efficient suppliers (Shadur & Bamber, 1994)

Nowadays, the concerns of having an effective lean supply chain systems becoming so important. But it has been highlighted by Anand and Kodali (2008) that the theory and

concepts of lean supply chain is not yet fully developed, although a lot of recent publications regarding lean supply chain can be seen in journals. Gomes and Mentzer (1988) also highlighted "that in spite of the potential for gains, utilization of lean principles in strategic logistics has been hampered by a lack of consistent definition of the concept across functions and a lack of an overall systems approach to guide empirical research." From point of views, lean supply chain concept is important especially on current growing supply chain system in Malaysia business perspectives and environment. Therefore, it is interesting to study on the lean supply chain practices which are suitable to be applied to improve performance of lean and lean supply chain. Since the study is new, it will be expected to have such on excellent results on lean supply chain practices and performances in Malaysia.

1.2.1 Lean Basics

There are lots of definitions available to define "Lean". For example, The National Institute of Science and Technology (NIST/MEP, 1998) defines Lean as "A systematic approach to indentifying and eliminating waste (non-value added activities) through continuous improvement by following the product at the pull of the customer in pursuit of perfection"(Buzby, Gerstemfeld, Voss & Zeng, 2002). Simply, lean means to create more value for customers with fewer resources, in other words, the fundamental ideas is to maximize customer value while minimizing waste. Actually, the word "Lean" was first used in the Future Car Investigation by MIT professors to interpret Japan's new production system that do away with mass production (Womack et al., 1991; Macduffie & Helper, 1997; Conti et al., 2006) since it produces much waste. "Waste" is defined as anything that interferes with the smooth flow of production (Macduffie & Helper, 1997). The eight wastes highlighted in TPS are overproduction, waiting, conveyance, over processing, excess inventory, movement,

defects and unused employee creativity, and the biggest one being overproduction (Monden, 1998; Liker, 2004).

Wu and Wee (2009) concluded that the term "lean" means a series of activities or solutions to eliminate waste, reduce non-value added (NVA) operations, and improve the value added (VA). This VA and NVA concept were derived mainly from TPS. A lean organization understands customer value and focuses its key processes to continuously increase it. The ultimate goal is to provide perfect value to the customer through a perfect value creation process that has zero waste. To make Lean success, level of thinking need to be change in order to focus of management from optimizing separate technologies, assets, and vertical departments to optimizing the flow of products and services through entire value streams that flow horizontally across technologies, assets, and departments to customers (Lean Enterprise Institute, 2009). Eliminating waste along entire value streams, instead of at isolated points, creates processes that need less human effort, less space, less capital, and less time to make products and services at far less costs and with much fewer defects, compared with traditional business systems. Companies are able to respond to changing customer desires with high variety, high quality, low cost, and with very fast throughput times. Also, information management becomes much simpler and more accurate (Lean Enterprise Institute, 2009). The fundamentals of lean are shown in Figure 1.1:-

Lean philosophy emphasizes eliminating waste, simplifying processes, and continuous improvement. Lean is about doing more with less: less time, effort, space and money.

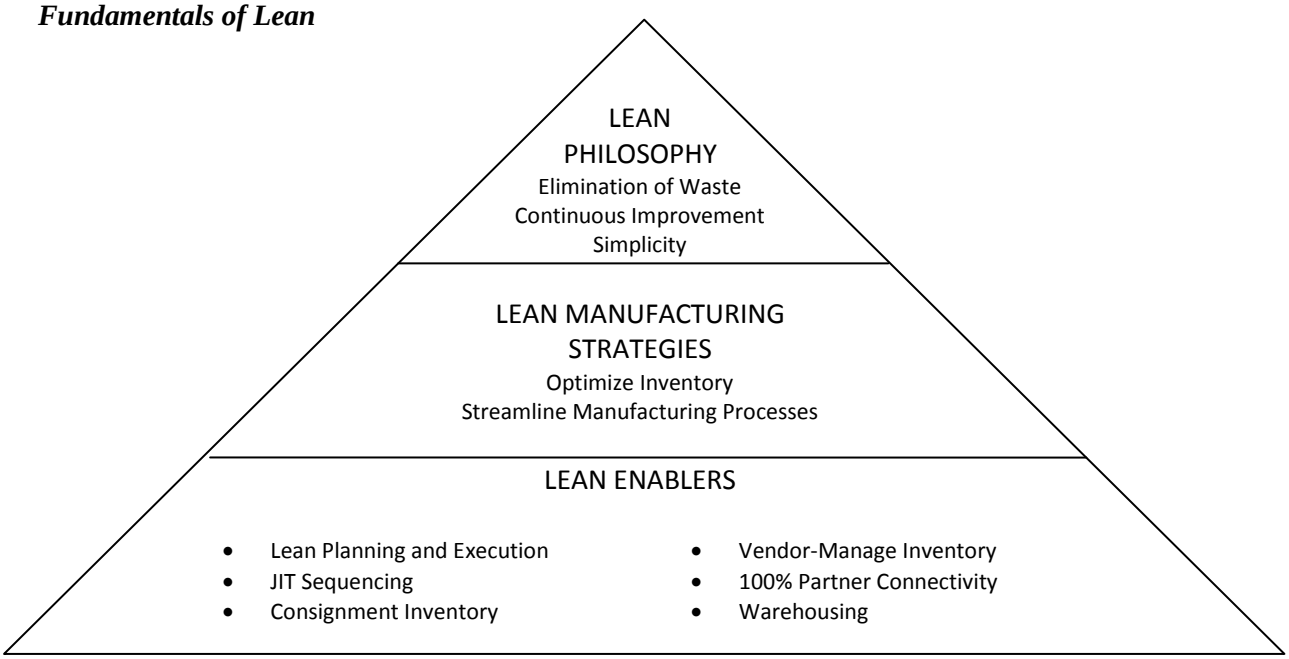
Lean strategies allow manufacturers to systematically and continuously eliminate the waste that results from inefficient processes, which can include inventory, over production, waiting, transportation, motion, over processing, and defective products. Optimizing inventory and streamlining manufacturing processes are two commonly

deployed lean manufacturing strategies because automotive manufacturers realize that cumbersome business processes have added inefficiencies, costs and weeks to the industry's mass production business model.

Lean enablers are the tools that make the strategies work for lean planning and execution, JIT sequencing, consignment inventory, Vendor-Managed Inventory.

Figure 1.1:

Fundamentals of Lean



Adapted from QAD Inc, White Paper on 'Streamlining for Success: The Lean Supply Chain' (2003)

According to Anand and Kodali (2008), only in recent times, researchers have emphasized that the theory and principles of lean and its associated tools, techniques, practices and procedures can be extended outside the boundaries of an organization to its supply chains. However, the concept of lean supply chain was proposed in 1994, when the proponents of lean manufacturing, Womack and Jones (1994) envisioned the concept of 'lean enterprise'. Womack and Jones (1994) realized that applying lean principles to achieve

individual breakthroughs can be linked up and down the value chain to form a continuous value stream that creates sells and serves a family of products; thereby, the performance of the whole stream can be raised to a dramatically higher level. However, approaching the supply chain process through lean manufacturing principles is still a complex task (Anand & Kodali, 2008). This is supported by McKee and Ross (2009) in which they claimed that the concept of supply chain is perhaps the most critical management concept and practice shaping today's business. According to the Council of Supply Chain Management Professionals (2008), supply chain can be defined as encompassing "the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. It also includes coordination and collaboration with channel partners, who can be suppliers, intermediaries, third-party service providers and customers. The supply chain management concept has evolved with it through the five distinct stages shown in Figure 1.2 below.

Figure 1.2:

Evolution of SCM

to 1960s **Stage 1** ⇨	1970s-1980s **Stage 2** ⇨	1980s-1990s **Stage 3** ⇨	1990s-1999 **Stage 4** ⇨	2000- **Stage 5**
Warehousing and Transportation	Total Cost Management	Integrated Logistics Management	Supply Chain Management	Total Cost Management
Management focus Operations performance Efficiencies	Management focus Optimizing Operation Costs & Customer Services	Management focus Tactics/Strategies Logistics Planning	Management focus Supply Chain Strategies, Chanel Co-evolutions, Goals	Management focus Internet, e-business, e-marketing, SCM Synchronizations
Organization Design Decentralized Functions	Organization Design Centralized Functions	Organization Design Integrated of Logistics Functions	Organization Design Partnering Virtual Organizations Market Co-evolution	Organization Design Networked Chanel .coms, Exchanges Agility/Scalability

Adapted from McKee & Ross (2009)

According to McKee and Ross (2009), stage 1 is the era of logistics decentralization. In stage 2, logistics began the evolution from functional decentralization to organizational centralization driven by new attitudes associated with cost optimization and customer service. Stage 3 represents the dramatic expansion of logistics from a narrow concern with internal cost management to new concepts calling for the linkage of internal operations with analogous functions performed by trading partners. As the concept of trading partner collaboration grew, the old logistics model gave way in stage 4 to full-blown SCM. In year 2000s, the application of lean concepts to closely integrated trading-partner networks is driving stage 5, lean SCM. Lean SCM is a supply chain operational and strategic management philosophy that utilizes Internet-enabling technologies to effect the continuous regeneration of supplier and service partner networks (McKee & Ross, 2009). A lean supply chain network is empowered to execute superlative, unique customer-winning value at the lowest cost through the collaborative, real-time synchronization of product/service transfer, demand priorities, vital marketplace information and logistics delivery capabilities. Consequently, the following subsection will discuss on the concept and importance of lean supply chain.

1.2.2 The Concepts and Importance Lean Supply Chain

Several researchers, such as Lee *et al*. (1997) and Lummus *et al*. (2003), explained that the information transferred from one stage to another in supply chain tends to be distorted and can misguide upstream members in the production decisions, resulting in wastes, thereby affecting the coordination between the different stages of a supply chain. Lean supply chain continuous improvement processes to focus on the elimination of waste or non valued-added functions. These waste and non value-added stops across the supply chain and reduce set of times to allow for the economic production of small quantities. Therefore archiving cost

reduction, flexibility and aiming for external responsiveness by responding to customer requirements (Turkett, 2001). Whereby, back to the views of Booth (1996), he stated that for the internal responsiveness, the organizations adopted and time-based competition paradigm, which ensure that development and production time is compressed, thereby archiving higher responsiveness and profitability, justifying higher prices for enhanced customer service and leading to a rapid innovation and lower cost of quality.

> *"A lean supply chain is a great enabler for any organization that strives to become more lean and efficient. Organizations within a lean supply chain are able to leverage their own lean journey more easily, delivering better customer value by responding more efficiently, quickly, and predictably to customer needs. That, in turn, facilitates the operation of the lean supply chain, creating a virtuous cycle that ultimately translates to superior financial performance for these organizations".*
>
> Industry Weeks, 12 Sept. 2007

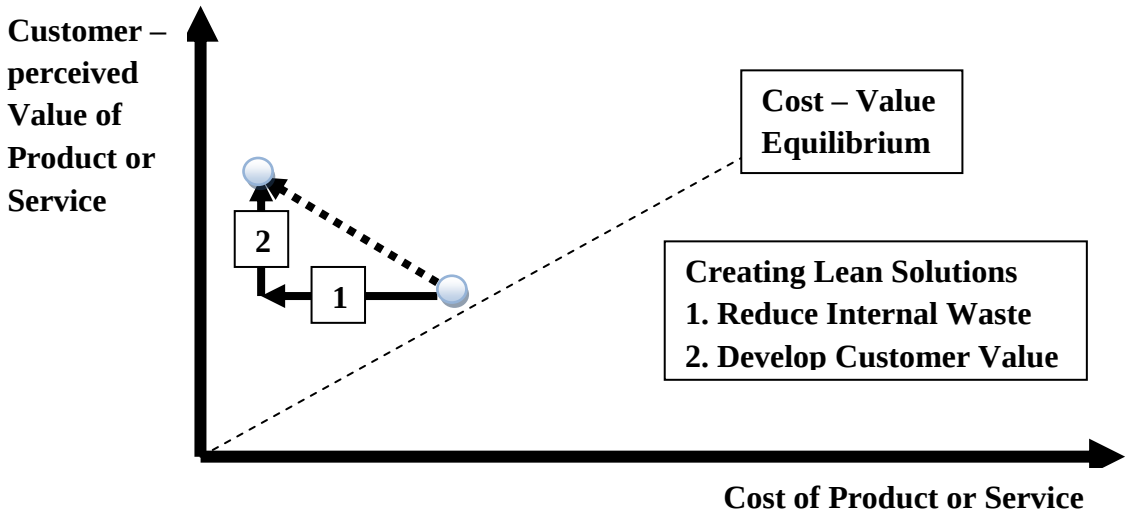
Martin (2007) committed with other two components that related to good foundation of excellence for a Lean program. These are performance-based metrics and operational standardization to minimize process variations. Unfortunately, not every organization has the discipline to adopt these systems due to a combination of poor education, incorrect measurements and improper resource alignment. From these arguments, Turkett (2001), Booth (1996) and Martin (2007) has the similarity of lean philosophy to banish waste or *Muda* or non value-added activities in order to define the successful of lean adoption itself as to focus on whole improvement internal-externally on performance-based metrics and operational standardization. The adoption must happen across the entire supply chain therefore it is very important to educate the entire chain to address down towards lean culture in the target organization. To value on the lean adoption in some organizations, it has been supported by an excellence research on lean adoption by APICS, Oracle, and Supply Chain Vision. There are collaboration among top research companies like APICS, Oracle, Supply

Chain Vision & Georgia Southern University (2004) to study on surveys on the development and adoption of lean principles in supply chain management. It does not represent an endorsement of a particular company, methodology, or solution, but rather, it demonstrates APICS' efforts to provide the insight into current issues and emerging in the supply chain trends.

The research focuses more on the adoption of lean in the demand management, standardization, waste and culture across the supply chain behaviors. Lacking of poor and inadequate practices of Lean philosophy and common organization practices are major concerns on Supply Chain improvement (APICS, Supply Chain Visions, Oracle Corp. and Georgia Southern University, 2004). From the research paper done by APICS, Supply Chain Visions, Oracle Corp. and Georgia Southern University, 2004, the surveys has come out with a process that call "Lean Supply Chain Best Practice Process Framework", which is the framework to be used as a tool for companies to help and identify the potential gaps in their processes. Implementers and practitioners can use this tool to identify every single aspects and points on the companies' process strengths and weaknesses. On top of that, they can focus on their efforts on those areas where the improvement efforts will be drive the most benefit. End results can be shared and compared (with discretion) with other organizations in the supply chain to improve overall effectiveness.

Figure 1.3:

Cost Versus Value Equilibrium



Source: Hines, Holweg and Rich (2004)

Hines, Holweg and Rich (2004) have come out with an interesting structure of lean supply chain study on the comparison between cost versus values of equilibrium. Figure 1.3 highlights the relationship between value and cost, and shows how products or services can be plotted with regards to their relative cost-value proposition to the customer. Added by McGill and Slocum (1993), the elaborations on the cost-value equilibrium, in which, claimed that if a product or service can be positioned, the more attractive proposition it is to the customers. Furthermore, the argument of cost-value equilibrium denotes the situation whereby the product provides exactly as much value, which the customer is willing to pay for, as the product costs. To explain further:

- Value is created if internal waste is reduced, as the wasteful activities and the associated costs are reduced, increasing the overall value proposition for the customer.

- Value is also increased, if additional features or services are offered, which are valued by the customer. This could entail a shorter delivery cycle or smaller delivery batches, which might not add additional cost, yet add customer value.

To summarize the above discussions, a critical point in the lean thinking is the focus on to eliminate waste and increase value and cost. However, Hines, Holweg and Rich (2004) supported that, value creation is seen as equal to cost reduction and his represents a common yet critical shortcoming of the understanding of lean. Some point been discussed by Ilyas, Shankar and Banweet (2008), the underlying theme in lean thinking is to produce more or do more with fewer resources, which is product value, while giving the end customer exactly what they want. In other word, it means to focus on each product and its value stream. In addition to Ilyas, Shankar and Banweet (2008), organizations must be ready to ask and understand which activities truly create value and which ones are wasteful. Martin (2007) has describes that supply chain will benefits for typical lean practices that have been classified for a certain improvement area such as in the Table 1.1.

Table 1.1:

Typical Lean Supply Chain Benefits

Category		Improvement
1.	Process Development	25%-75%
2.	Labor	15%-50%
3.	Floor Space	25%-50%
4.	Errors	25%-90%
5.	Excess Capacity	25%-75%
6.	Throughput Time	25%-95%
7.	Delivery Time	25%-80%

Source: Martin (2007)

Table 1.1 shows that the typical lean supply chain benefits are sourced by seven categories of improvements. Windows of improvement for most categories can be specifying

human related improvement, operation related improvement and processes related improvement. The most contribution is operation related improvement; the categories are Floor Space (25% - 50%), excess capacity (25% - 75%), throughput time (25% - 95%) and delivery time (25% - 80%). Then follow by human related improvement, the categories involve are labor (15% - 50%) and errors improvement (25% - 90%). The less contribution is process related improvement, the categories specifying only process development (25% - 75%).

Besides value, lean supply chain thinking emphasizes quality for each product from the perspective of the end-customer; Lean producers rely on confrontational strategies to compete head-on-head for market share by developing competitive advantages (Comm & Mathaisel, 2004). To successfully engage in confrontation, a firm must become expert at developing low-cost, high-quality products that have the functionality customers demand (Cooper, 1996). According to Ilyas, Shankar and Banwet (2008), lean is how an ideally designed and operated supply chain should function. A supply chain must flows back from deliveries to the store or to the customer warehouse back through to purchase orders placed on suppliers. Additionally, for many years the philosophies of "leanness" and "economies of scale" have dominated manufacturing, but market pressures now apparently implemented a strategic and tactical framework that allows companies to behave in an adaptive or flexible manner that permits continuous evolution in markets (Ilyas, Shankar & Banwet, 2008).

The important thing to highlight is lean is not simply just about eliminating waste, it's also about eliminating waste and enhancing value (Tompkins, 2003). He discussed, value are measured in the main components of the lean supply chain – lean suppliers, lean procurement, lean manufacturing, lean warehousing, lean transportation and lean customers. From the aspects of a lean supply chain, organization need to take a look on speed and responsiveness to customers, reduced inventories, reduced costs, and improved customer

satisfaction, therefore supply chain as a competitive weapon (Schultz, 2006). Lean is a concept that has evolved over time, and will continue to do so. As a result of this development, significant confusion about what is lean, and what is not has arisen, a fact that clearly observable at both academic and practitioner conferences in logistics and operations management (Hines, Holweg & Rich, 2004). In addition, they have investigated a framework that explains the developments of the lean concept over time to discuss on:

[1].. What are the key stages of the lean evolution?

[2].. Within these stages, what are the key criticisms? And subsequently;

[3].. Are these criticisms justified?

Consequently, the study concerns are more on the fundamental questions, such as: Why is lean supply chain required? What are the processes that are typically carried out in an lean supply chain? What are the wastes in the supply chain processes? Furthermore, the different tools, techniques, practices and procedures (elements), which can be used in lean supply chain to eliminate wastes. Hence, a conceptual framework describing what constitutes as lean supply chain practices is proposed in this study.

1.3 Statement of the Problem

The inventions and developments in achieving a high degree of flexibility and customer responsiveness have progressed tremendously over the last century, starting from the industrial revolution in the 18th century (Aberdeen Group, 2006). However, the excessive developments, have led to the unwanted production called as waste (Womack et al., 1990). According to Anand and Kodali (2008), wastes can be defined as any activity that does not add value during the conversion of resources (which are predominantly raw material) into a product/service as desired by a customer.

Lean application is seen as one of the sensible solutions which are being adopted by many countries around the world to address the issues of waste. Suzaki (1987) reports seven types of waste identified at Toyota: waste from overproduction, waste of waiting time, transportation waste, processing waste, inventory waste, waste of motion, and waste from product defects. Consequently, Japanese automobile manufacturers achieved high quality and low costs in their production is by removing buffers and impediments from the system. Principles of lean thinking have been broadly accepted by many manufacturing operations and have been applied successfully across many disciplines (Poppendieck, 2002). While many researchers have studied on lean (Akel, Tommelein & Boyers, 2004; Shah & Ward, 2007; Liker & Wu, 2000; Worley, 2004, Hayes & Pisano; 1994, Shah & Ward, 2003; Sánchez & Pérez, 2001; Karlsson & Åhlström, 1996), little studies regarding lean have been done in Malaysia. This is agreed by Wong, Wong and Ali (2009) in their study. Their study was initiated with a focus to examine the adoption of lean manufacturing in the electrical and electronics industry by looking at various issues such as its understanding among the respondent companies, its benefits and obstacles, the tools and techniques used.

Lean excellence is a coordinated response to today's highly competitive environment (Williams, 2008). As the success of lean has become more widely known, it is being adopted by many industries and is spreading into many other areas of the value chain. Interestingly, starting the concepts from lean manufacturing, newly developed supply chain paradigms and systems are always examined in relation to leanness. More and more, firms are witnessing a transformation in which lean practices has been applied to logistics and supply chain management (Abbot, Manrodt & Visatek, 2005). Papadopoulou and Ozbayrak (2003) have stated that leanness serves in most cases as the landmark paradigm with which comparisons are being drawn between the latter and recently pioneered approaches. They further argued that in an organization, supply chain encompasses all aspects of the systems but the

integration of seamless full working systems is undoubtedly expensive but many companies can cut all the waste from the system to ensure seamless and effective operation. In addition, wastes are created due to the improper flow of materials, information and funds within the supply chain (Anand & Kodali, 2008). For example, if the suppliers of a manufacturer are supplying only in bulk and if the lead times are longer, then the time of the manufacturer is wasted.

Among other examples are:- Baum (2004) commented that around $250 to $400 billion are wasted annually in North American industries alone due to inefficiencies in the supply chains. They estimated that this amount would be as big as $1 trillion worldwide. Taylor (2006) identified some of the wastes (*i.e.*, issues and problems) in pork supply chains and classified them into wastes related to product flows, wastes related to information and wastes related to management and control. Al-Hakim (2005) detailed the relationship between waste reduction and supply chain strategies and argued that the competitive advantage of a supply chain can be viewed as an ongoing process of acquiring control over different types of waste. Daniel and Womack (2002) differentiated between traditional lean and lean supply chain. According to them, the focus of traditional lean is delivering value to the customer. The primary mechanism for improvement is removing waste from the organizations processes with customers in mind. On the other hand, the lean supply chain concept is built on the broader goal of providing value to the customer by optimizing the performance of the supply chain as a system. A typical lean supply chain involves integrating all the upstream and downstream activities into a coherent whole and only very few papers that addressed the concept of applying lean manufacturing principles to the whole of supply chain are available (Anand & Kodali, 2008). In a simple term, lean supply chain can be defined as an application of lean manufacturing principles to supply chain to integrate the

activities of all the stakeholders involved in the supply chain network and provide 'value' to the customers by eliminating wastes.

Following this, IBM (Malaysia) Global Business Consulting Services, (2010) highlighted that to deliver products at the total cost while having top notch excellences in the value-added processes is a major challenge to the lean supply chain practices and performance. Realizing the importance of the lean as a competitive weapon in supply chain, the Malaysian government has extended the role and function of the Malaysia Productivity Center (MPC). MPC is now spearheading the effort to prepare local industries to compete globally by automating their lean supply chain management processes (Malaysia Productivity Center, 2009). A survey needs to be carried out in order to gauge how organizations in this country practice it. The purpose of this study, therefore, is to investigate the level of lean supply chain practices by the electrical and electronics companies in Malaysia in which that the lean supply chain will be one of the most excellence way in business practices towards supply chain performance. Ducharme and Lucansky (2002) supported that lean supply chain is to create the values and opportunity of business process improvement and sustainability. Foremost, at the same time it will be providing continuous profitability towards Malaysian business environment.

1.4 Research Questions

In the context of lean supply chain practices, the coverage of the scope will include the investigations in a sense of:

1. What are the extents of implementation for lean supply chain practices in Malaysia?
2. What are the effects of lean supply chain practices on the performance of the lean in Malaysia?

3. What are the significant relationships between lean performances with lean supply chain performance in Malaysia?
4. Does lean performance mediate the relationships between lean supply chain practices and with lean supply chain performance?

1.5 Research Objectives

The objectives of the study as follows:-

1. To investigate the extent of implementation for lean supply chain practices in Malaysia.
2. To examine the effects of lean supply chain practices on the performance of the lean in Malaysia.
3. To identify the significant relationships between lean performances with lean supply chain performance in Malaysia.
4. To examine whether lean performance mediate the relationships between lean supply chain practices and with lean supply chain performance in Malaysia.

1.6 Significance of the Study

Malaysia is a well known as a developing country that having strong economy activities and economy policies. Starting from the basic of agricultural base economy changing to hi-tech manufacturing sectors that involving the demand of the global economic growth. The current situations are the populations of electric and electronics operations sector expanding together with the demand of supply chain management aggressively. The needs and concerns towards the effectiveness of supply chain management systems are vital, so the study of current trends is important in order to benefit supply chain performances. Lean supply chain study is seeing one of the best options to explore, and the expected end results should be answered the

questions of the study proposed, so that the significant of lean supply chain practices and the effects of lean supply chain performance in Malaysia is very important. Significantly, anything associates with lean supply chain, its promoting banish waste and increase values stream for supply chain systems.

1.7 Research Contributions

This study attempts to enrich the research contributions in the aspects of:

1 - Theoretical contributions to knowledge and;

2 - Practical contributions to business and public organizations.

1.7.1 Theoretical Contributions

Due to some increasing concerns and needs to the lean supply chain effectiveness, there are general guide lines on the importance of lean supply chain. There are very few studies have been conducted to investigate the issue, especially in Malaysia. One evidence on supply chain study related supply chain improvement, more towards focusing on issues and challenges to logistics and supply chain improvement (Rosena, Harlina & Sabariah, 2008). However, they do not specifically focus on lean supply chain itself. This study expected to contribute the knowledge on practices and performances on lean supply chain in Malaysia, especially in the Malaysian Electric and Electronics operation sectors. Accordingly, this study is expected to add to the following areas of knowledge about lean supply chains:

1. The study identifies lean supply chain practices that are implemented in the Malaysian Electric and Electronics sector and portrays their extent of practices. Since that information from the literature review findings are lacking, the study can add considerable information in this area and provide a fundamental for future studies about the issue.

2. The study identifies lean performance as a mediator for lean supply chain practices in the Malaysian context and reveals the influence of lean performance factor on lean supply chain practices. This can add to the knowledge about how lean supply chain practices are constraint among organizations in Malaysian context. This knowledge can also enrich theories that deal with constraints of innovations or practices among organizations, such as lean philosophy and the theory of constraints.
3. The study identifies the lean supply chain performance from lean supply chain practices and shows the influence of each type of lean supply chain practices on the lean supply chain performance. This can add to the knowledge about the value and importance of lean supply chain initiatives to organizations and the society at large.

1.7.2 Practical Contributions

Accordingly, the study is expected to improve and enhance the knowledge and performance of supply chain systems for organizations in Malaysian Electric and Electronics business as following ways.

1. The study discloses the objective, concept, significance, and performance of lean supply chain practices, thus, it can increase practitioner's understanding of the importance and value of lean supply chain practices. This understanding is very critical due to the increase of economic importance of supply chains in addition to their role in enhancing competitive power of companies in international markets.
2. The study shows that key performance for the implementation of lean supply chain practices, therefore, it can enhance the understanding of the important of lean supply chain practices in the organizations. This knowledge of information can help the lean